

Unpacking America's Manufacturing Productivity Slowdown

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Highlights

- Productivity growth in the U.S. has weakened over the past two decades driven mainly by a slowdown in the manufacturing sector. Productivity growth in the sector declined from 5% at the beginning of the millennium to almost 0% in 2013, and has only edged up since.
- There are several explanations for the manufacturing productivity growth slowdown. Three of the main factors are increased industry concentration, slowing technological change, and global offshoring.
- Looking ahead, we don't expect a strong rebound in manufacturing productivity growth. The forces weighing on productivity will likely continue to do so over the next few years. However, over the longer run, technological progress in areas such as automation, 3D printing and artificial intelligence, could lead to a pickup in manufacturing productivity.

Productivity growth in the U.S. has been on a steady decline for the past two decades. Growth in output per worker fell from 2.1% in the 1990s to 1.1% in the 2010 to 2018 period. This decline has been the main reason for the relatively weak pace of economic growth in the decade-long expansion following the Great Recession (Chart 1).

Delving into productivity trends by sector shows that the manufacturing sector was the most important source of this slowdown. Relative to all other sectors, manufacturing experienced the steepest decline in productivity growth. Indeed, after accelerating to 5% annualized growth at the start of the millennium, productivity in the sector slowed to a virtual standstill by 2013. Since then, productivity growth in manufacturing has continued to disappoint, only edging up slightly in 2018 (the most recent year available).

Looking ahead, we don't expect a major revival in manufacturing productivity. The forces behind the weakness – increased industry concentration, slowing technological change, and global offshoring – appear unlikely to reverse any time soon, suggesting a continuation of the recently observed trend.

Productivity Growth Slowdown a Broad-Based Phenomenon

In the early 2000s, trend productivity grew steadily at around 2% on an annual basis (Chart 2).¹ Productivity growth in service-industries was solid, in line with the overall average. But the real star of the show was goods-producing industries, with productivity gains averaging around 4%, nearly double that of services.

That came to an abrupt halt around 2004 as productivity growth in both goods and services industries started falling. The drop was far

Chart 1: U.S. GDP Growth Has Slowed Due to Weaker Productivity Growth

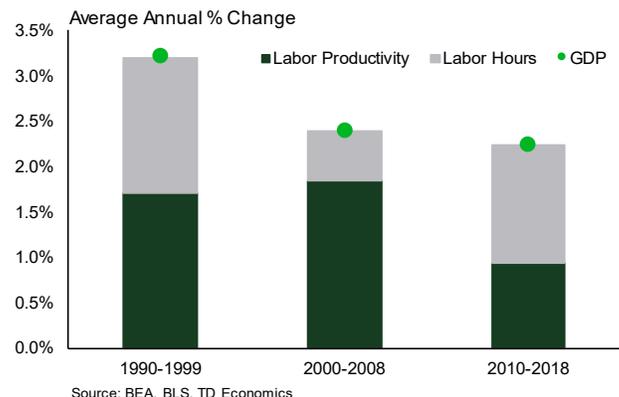
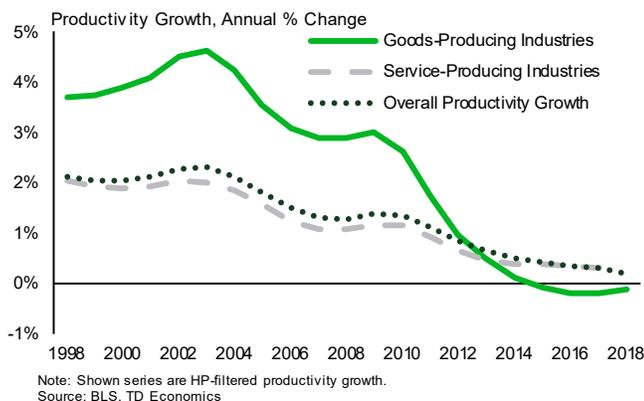


Chart 2: Productivity Growth Slowdown Has Been Concentrated in Goods-Producing Sectors



more precipitous in the goods industry, where productivity growth declined from around 4% in 2000 to -0.1% in 2018, dipping below productivity growth in services along the way. More troubling is that trend productivity in goods industries has been contracting since 2015.

Breaking down the productivity growth slowdown by industry, the weakness is concentrated in the manufacturing industry (Chart 3). The mining industry, through the shale oil revolution, saw a revival in the post-crisis period. There were also productivity improvements in information, transportation and utilities industries. However, for most service industries productivity growth slowed between 2000 to 2018.

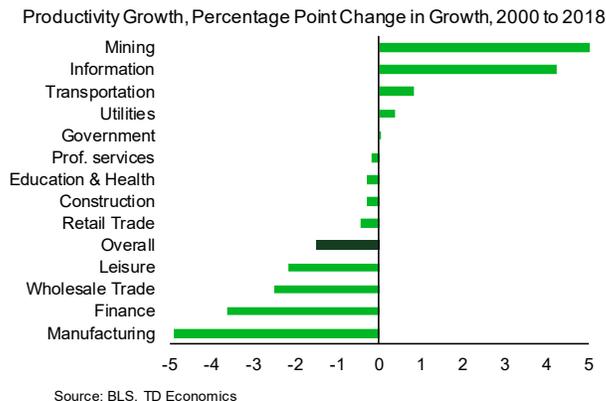
The Decline in Manufacturing Productivity

The manufacturing industry was once the beacon of productivity in the U.S., generating gains in the range of 4% to 8% in the late 1990s through to the early 2000s (Chart 4). But, beginning in 2004, productivity growth began a secular downturn that continued through to 2015. The magnitude of the decline is astonishing: productivity growth fell from a peak of 7.6% in 2003 to -0.1% in 2015, a drop of eight percentage points. Since 2015, productivity growth has improved modestly, but it continues to remain at very low rates.

The manufacturing industry’s abrupt drop in productivity growth was the main driver of the slowdown at the aggregate level. If productivity growth in manufacturing remained at its peak in 2003, overall productivity growth would have been 0.5 ppts higher in 2018.

There are several explanations for the manufacturing productivity growth slowdown. Each provides some insight, but no single reason is individually conclusive. However, a

Chart 3: Productivity Growth Declined for Most Sectors, Mining Saw a Revival



growing body of evidence suggests that the following three factors have played crucial roles in sinking productivity of the manufacturing sector.²

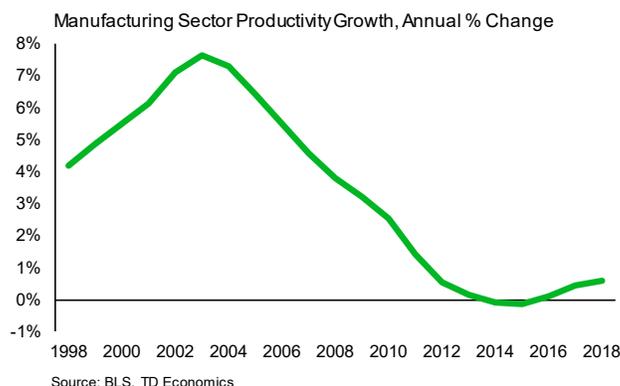
1. Slowing Technological Advances

One popular explanation is that productivity growth is returning to a more normal pace following extraordinary gains in the 1990s and early 2000s.³ During these years, significant advances were made in semiconductor technology, which reduced information technology (IT) prices and boosted capital investments, resulting in higher productivity growth in the manufacturing industry.⁴ Since then, technological advances have slowed, leading to declining productivity growth.⁵ However, with growth now persistently weak, it appears that other factors are also depressing manufacturing productivity.

2. Global Offshoring

The other consequence of advances in information technology was a dramatic reduction in the cost of communi-

Chart 4: Manufacturing Sector's Productivity Growth Plummeted, After a Strong Performance in Early 2000s



cation. This, along with China’s entry into the World Trade Organization in 2001, allowed global goods production to be “unbundled” across national borders. As a result, the manufacturing supply chain has become more fragmented across the globe, with an increasing amount of inputs sourced from places outside the U.S. – a practice commonly known as offshoring. For example, to produce its vehicles, General Motors is involved in 133 manufacturing operations spanning 16 countries around the world.⁶

Offshoring lowers costs for businesses and provides a competitive advantage, but it may also reduce innovative capacity within the U.S. Workers less exposed to the various aspects of the production process are less likely to identify areas ripe for efficiency gains, improve existing technologies, and find new applications for these technologies.⁷ Indeed, this has already occurred in some manufacturing subsectors that produce goods such as batteries and electronics and semiconductors. As businesses formerly domesticated in the U.S. shifted production of these goods to other countries, the know-how went along with it. All in all, while the research so far is inconclusive, evidence is mounting that global offshoring may have weakened productivity growth in the U.S. manufacturing sector.

3. Increasing Industry Concentration

Another potential reason for the productivity growth slowdown is increasing industry concentration. That is, business competition within industries is on the decline. Competition encourages creative destruction. Faced with competition, businesses that are continually innovating and lowering costs gain or maintain market share, while those that don’t usually fail.⁸ Since the 1980s, competition in the manufacturing industry has been on the decline as witnessed by weakening business start-up and failure rates (Chart 5). Recent research suggests slower knowledge diffusion is an important reason for this decline. Firms are increasingly using patents to limit the transfer of knowledge within industries, thus raising barriers to entry and giving an advantage to incumbent firms.⁹ This practice grew in the 2000s likely further weakening competition, therefore constraining productivity growth.

Manufacturing Productivity Growth Unlikely to Relive its Glory Days

Looking ahead, over the next few years, the forces weighing on manufacturing productivity will likely remain in place. The fall in communication costs made feasible by the internet and digital communication will not be reversed.

And, while the U.S.-China trade war has weighed on global supply chains, so far it has done little to shorten them. Instead, investment in the manufacturing sector has been held back by elevated uncertainty from trade negotiations, putting further downward pressure on productivity growth.

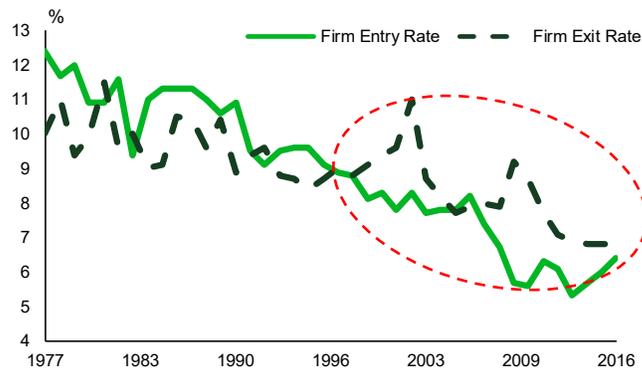
By the same token, the decrease in competitive pressures and accompanying drop in firm start-ups and failures is a slow-moving train. Changes in legislation may help, but will face resistance and do not appear to be forthcoming.

Over the longer term, however, we could see a pickup in manufacturing productivity, albeit not to rates observed in the 1990s. Technological progress is advancing in areas such as automation, 3D printing and artificial intelligence, and it could just be a matter of time before they are efficiently adopted in manufacturing processes. These may help on multiple fronts: they all reduce the labor cost advantage of emerging markets and could help to bring more production back to the U.S. And, assuming these general-purpose technologies are widely dispersed across firms, they may also help to increase competitive pressures and drive further innovation.

Another factor that could potentially support a pickup in manufacturing productivity over the long haul is the 2017 U.S. Tax Cuts and Jobs Act, which substantially lowered the marginal effective tax rate on investment in manufacturing as well as other key industries.

This remains an area to watch. While so far there is little evidence of technological advances showing up in the productivity numbers, sudden jumps have been known to occur. This is perhaps the best hope for a major pickup in overall U.S. productivity growth.

Chart 5: The Decline in Business Dynamism in the Manufacturing Industry Has Intensified in the 2000s



Source: Census Bureau (Longitudinal Business Database), TD Economics

Endnotes

1. Trend productivity growth refers to productivity growth measured as a percentage change of GDP per worker, smoothed by a Hodrick-Prescott filter.
2. These factors are not independent from one another and therefore likely interact to weigh further on productivity growth.
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4. Jorgenson, Dale (2001), "Information Technology and the U.S. Economy", American Economic Review 91, no. 1, pages 1-32.
5. Fernald, John (2014), "Productivity and Potential Output before, during, and after the Great Recession", NBER Chapters, in: NBER Macroeconomics Annual 2014, Volume 29, pages 1-51.
6. <https://www.gmsustainability.com/manage/supply.html>
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8. Decker, Ryan, John Haltiwanger, Ron Jarmin, Javier Miranda (2017), "Declining Dynamism, Allocative Efficiency and Productivity Slowdown", Working Papers 17-17, Center for Economic Studies.
9. Akcigit, Ufuk, Sina Ates (2019), "What happened to U.S. Business Dynamism?", NBER Working Papers 25756.

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